

hp StorageWorks Fabric Interoperability: Merging Fabrics Based on C-Series and M-Series Fibre Channel Switches

Fourth Edition (April 2006)

Part Number: AA-RVH9D-TE

This document summarizes the steps required to merge two SAN fabrics, where one is constructed with C-Series SAN switches and the other is constructed with M-Series SAN switches.

For the latest version of these Application Notes and other SAN fabric interoperability documentation, access the HP storage web site at: <http://www.hp.com/country/us/eng/prodserv/storage.html>.

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Fabric Interoperability: Merging Fabrics Based on C-Series and M-Series Fibre Channel Switches
Application Notes
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About this document

This section describes the content reflected in this document, including:

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Application notes information

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Intended audience

This document is intended for customers who are considering merging SAN fabrics where one fabric is constructed with C-Series SAN switches and the other fabric is constructed with M-Series SAN switches.

Other fabric interoperability documentation

Other documents that pertain to fabric interoperability include:

- *SAN Design Reference Guide*
- *Fabric Interoperability: Merging Fabrics Based on M-Series and B-Series Fibre Channel Switches Application Notes*
- *Fabric Interoperability: Merging Fabrics Based on C-Series and B-Series Fibre Channel Switches Application Notes*

Additional documentation, including white papers and best practices documents, are available via the HP web site at: <http://www.hp.com..>

Introduction

This application notes discusses the details on how to configure and merge HP **C-series** and **M-series** switches into a single standards-based interoperable fabric. This document also provides information on supported configurations, expected behavior and any exceptions in the interoperability mode.

Note: This application note describes Fibre Channel World Wide Names (WWNs) in terms of port level names or node level names. Port level WWNs or node level WWNs refer to the Fibre Channel addressing mode in use. This is different from port level zoning or node level zoning which refers to how zoning is defined in the zoning database and how zoning is enforced by Fibre Channel switches in the fabric.

How to read this document

If you are going to configure and merge the C-series and M-series fabrics, read sections

- Check List for Merging Fabrics
- Merging Fabrics and Verification
- Troubleshooting

If you are interested only in supported features, configurations and switch/os/storage system versions, read the sections on:

- Expected Behavior from Fibre Channel Services
- Interoperability mode behavior summary by Switch Type
- Supported Configurations

Check List for Merging Fabrics

M-Series

Complete the following steps before merging the fabrics.

- M1. Verify Switch Firmware Versions
- M2. Verify/Configure Switch Domain IDs
- M3. Verify switch/fabric default settings
- M4. Disable Management Server
- M5. Verify proper Zoning Configuration is in place
- M6. Disable Fabric Binding and Enterprise Fabric Mode
- M7. Configure M-series as the Principal (optional requirement)

C-Series

Complete the following steps before merging the fabrics.

- C1. Verify Switch Firmware Versions
- C2. Verify switch/fabric default settings
- C3. Verify the C-series switches (vSANs) are in Interopmode
- C4. Verify/Configure Switch Domain IDs

- C5. Verify proper Zoning Configuration is in place
- C6. Configure unique AREA byte for all the FCIDs

M-Series Configuration Steps

The following steps provide information on how to verify, configure M-series switches for Interoperability. While it is possible to accomplish this by using either the HAFM or the Embedded Web Server or the CLI, the following steps use only EWS for demonstrating this.

Step M1: Verify Switch Firmware Versions

Before merging the fabrics, make sure all the M-series switches in the fabric have the right firmware version. See [Table 3](#) for the correct firmware version to be used and update the switches if necessary.

- Launch EWS (Embedded Web Server) from your Web Browser using the IP address of the switch.
- Enter the Username and Password and press OK
- To Verify the firmware click on the View Tab and then Unit Properties Tab
- Verify the Firmware is at the right level, if not upgrade the firmware first before making any other configuration changes



Figure 1: Launch EWS and verify switch firmware version

For example, go to the following link and follow instructions to upgrade firmware for director-2/64 switch.

http://h20000.www2.hp.com/bizsupport/TechSupport/DriverDownload.jsp?pnameOID=215165&locale=en_US&taskId=135&prodTypeId=12169&prodSeriesId=326513&swEnvOID=54

Steps M2: Verify/Configure Switch Domain

Configuring the Domain IDs

- Before merging fabrics, ensure there are no duplicate domain addresses. If necessary change the domain ids on M-series switches using the steps below.
- Launch EWS (Embedded Web Server) from your Web Browser using the IP address of the switch.
- Enter the Username and Password and press OK
- To verify Domain ID, select View Tab and then Operating Parameters Tab

- Verify Active Domain ID
- To Change the Domain ID, select the Configure Tab, the Switch Tab and then Parameters Tab
- In the Preferred Domain ID field, enter the Domain ID you want to use. In this example the Domain ID is 4

Note: Select the domain IDs in the range 1-31 and this actually translates to 97-127 domain IDs in the Interop Mode (all numbers are in decimal).



Figure 2: Launch EWS and verify and configure switch domain ID

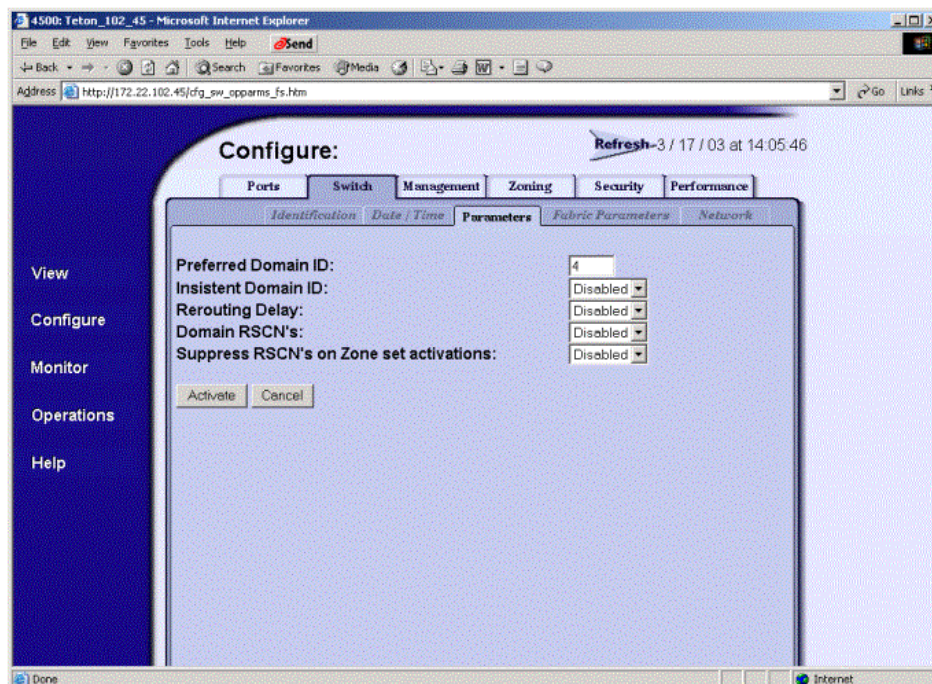


Figure 3: Configure domain ID

Step M3: Verify switch/fabric default settings

Ensure Interop mode is set to Open Fabric:

- Launch the EWS from your Web Browser
- This requires setting the switch in OFFLINE mode and hence plan accordingly for no data to flow through the switch during the change. To do this, Select Operations tab and then Online State tab and then click “Set Offline” button.
- Select Configure Tab, Switch Tab and then Fabric Parameters Tab
- Set Interop Mode to “Open Fabric 1.0” if not already selected
- Set the switch back to “Online” state after the change is made

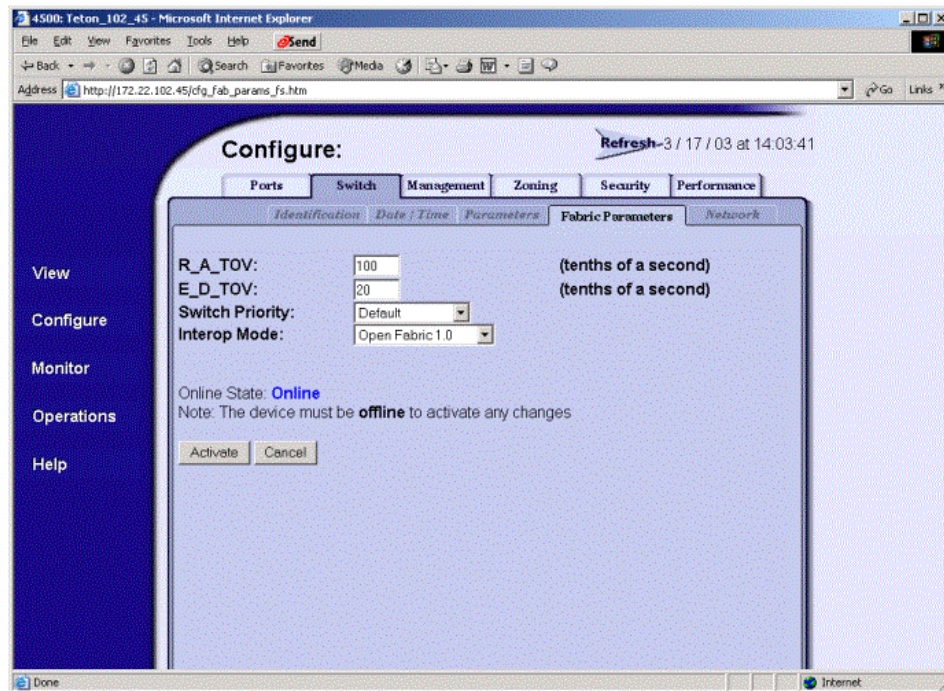


Figure 4: Setting switch Interop Mode

Ensure the default zoning is disabled

- Launch the EWS from your Web Browser
- Select the Configure option and then Zoning Tab
- Ensure the Default Zone field displays Disabled
- If not click on Disable Default Zone Tab.

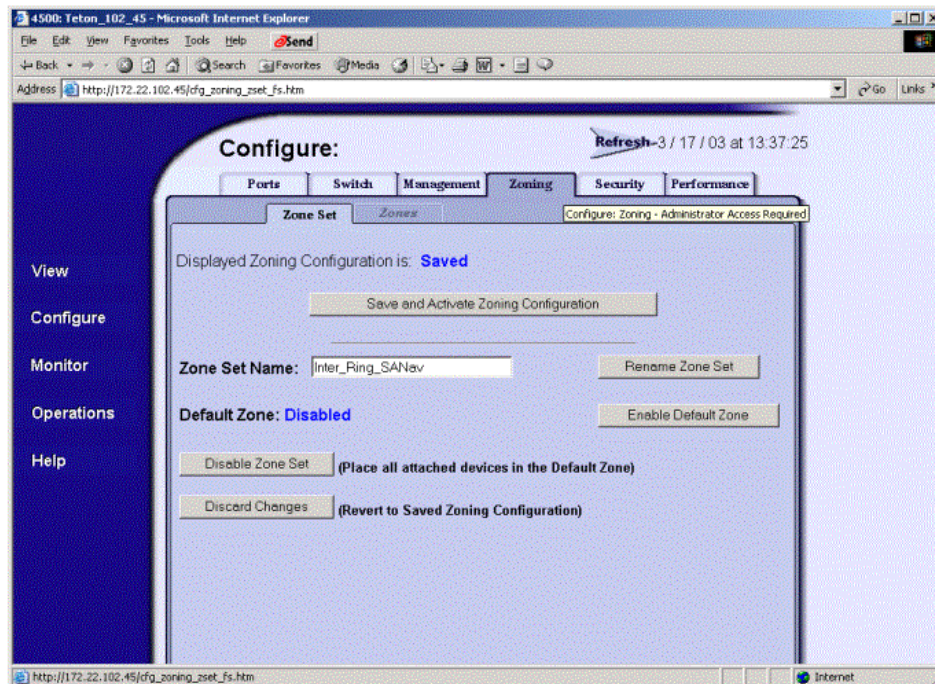


Figure 5: Disable default zoning

Ensure Rerouting Delay is enabled

- Launch EWS, enter the username and password, and select View/Operating Parameters
- Verify Rerouting Delay is enabled
- If not, select Configure/Switch/Parameters/Rerouting Delay and enable it

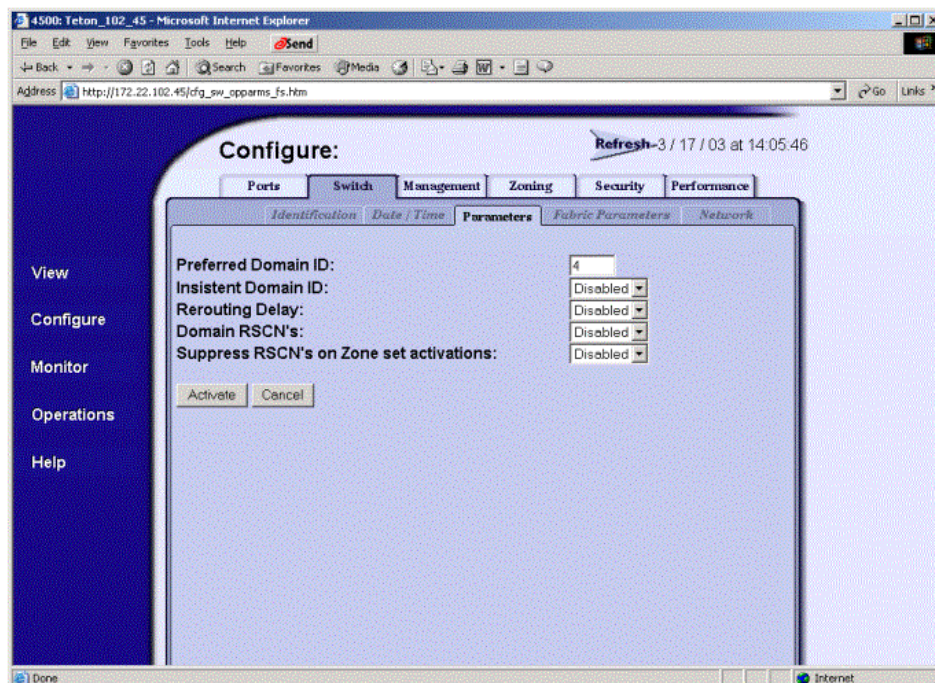
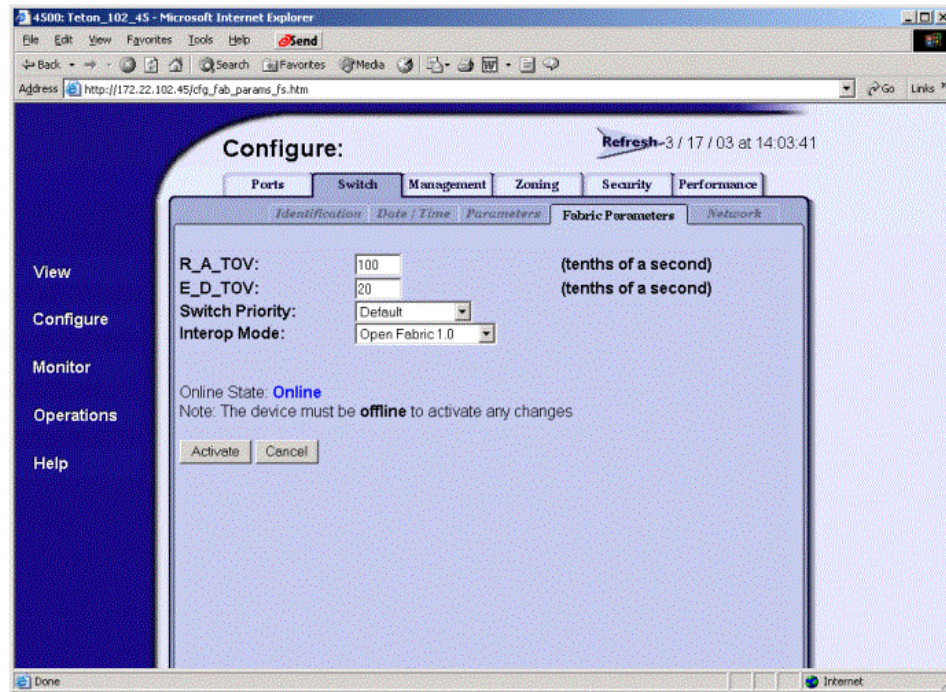


Figure 6: Enable Rerouting Delay

Ensure the default Time Out Values are set properly

- Verify R_A_TOV is set to 10 secs
- Verify E_D_TOV is set to 2 secs
- Launch EWS from your web browser
- Enter the Username and Password and press OK
- Select Configure/Switch/Fabric Parameters tab and verify R_A_TOV is 100 and E_D_TOV is 20. Note that these values are in units of “tenths of a second”
- If not, change them accordingly

**Figure 7: Set Time Out values****Step M4: Disable Management Server**

If the M-series product has a license key for Open Systems Management Server (OSMS), ensure Management Server is disabled:

- Launch EWS from your Web Browser
- Enter the Username and Password and press OK
- Select Configure/Management/OSMS
- If it displays “OSMS Not Installed” no further action required
- If not use HAFM and select Configure Management Server
- From the “Configure Open Systems Management Server” dialog box, make sure the Enable Management Server box and Host Control Prohibited box are not selected (not checked)

Step M5: Verify proper Zoning Configuration is in place

- For proper zoning merge and operation, ensure all zones are configured using only port level device WNNs

- Ensure proper zone naming conventions are adhered to, before and after the merge
- A name must be between 1 and 64 characters in length
- All characters must be ASCII characters
- The first character of a given name must be a letter. A letter is defined as either an upper case (A-Z) or a lower case (a-z) character
- Any character other than the first character must be a lower case character (a-z), an upper case character (A-Z), a number (0-9), or the symbol (_)

Ensure there are no Zone conflicts

- Verify that any zones with the same names on both the switches have the same members
- Check Zone/Zone Set names using HAFM or EWS

Step M6: Disable Fabric Binding and Enterprise Fabric Mode

If M-series product has a license key for SANtegrity Binding, ensure Fabric Binding and Enterprise Fabric Mode are disabled:

- To disable the above use HAFM and select Fabrics
- Select Enterprise Fabric and Fabric Binding
- From the Enterprise Fabric dialog box, ensure it is not selected (not checked)
- From the Fabric Binding dialog box, ensure it is not selected (not checked)

Step M7: Select M-series switch as the Principal

It is possible to use management tools from either M-series or C-series switches, but when you use HAFM/EWS as the management tool make sure you select the M-series switch as the principal. Here are the steps to accomplish this.

Note: This procedure requires changing the switch to offline state before making the change, so plan accordingly.

- Launch EWS (Embedded Web Server) from your Web Browser using the IP address of the switch.
- Enter the Username and Password and press OK
- Select Operations menu on the left and click on “Online state” tab
- Click on the “Set Offline” button
- Select Configure menu and then Switch/Fabric Parameter tabs
- Set switch priority to “principal”
- Go to “operations” menu again
- Select “online state” and click on the “Set Online” button

C-Series Configuration Steps

The following steps provide information on how to verify, configure C-series switches for Interoperability. While it is possible to accomplish this by using either the Fabric Manager or the CLI, the following steps use only CLI (telnet) for demonstrating this.

Step C1: Verify Switch Firmware Versions

Verify all C-series switches are configured with the proper firmware version as shown in **Table 4**. If necessary upgrade the switches with the correct firmware and refer to MDS 9000 Family Configuration Guide that can be accessed through the links provided at the following URL.

<http://h18006.www1.hp.com/products/storageworks/cmds9506/leavinghp-cisco.html>

```
sanergy4(MDS9506)# show ver
Cisco Storage Area Networking Operating System (SAN-OS) Software
TAC support: http://www.cisco.com/tac
Copyright (c) 2002-2003 by Cisco Systems, Inc. All rights reserved.
The copyright for certain works contained herein are owned by
Andiamo Systems, Inc. and/or other third parties and are used and
distributed under license.
```

Software

```

BIOS:          version 1.0.8
loader:        version 1.1(2)
kickstart:     version 1.2(1a)
system:        version 1.2(1a)

BIOS compile time:      08/07/03
kickstart image file is:
bootflash:/m9500-sflek9-kickstart-mz.1.2.1a.
kickstart compile time: 8/24/2003 13:00:00
system image file is:   bootflash:/m9500-sflek9-mz.1.2.1a.bin
system compile time:    8/24/2003 13:00:00
```

Step C2: Verify switch/fabric default settings

It may be necessary to change the Fibre Channel timers as well if they have been changed from the system defaults. The MDS 9000 and B-series FC Error Detect (ED_TOV) and Resource Allocation (RA_TOV) timers default to the same values. They can be changed if needed. The RA_TOV default is 10 seconds, and the ED_TOV default is 2 seconds. Per the FC-SW2 standard, these values must be the same on each switch within the fabric.

```

MDS9509 login: admin
Password: xxxxxxxxx
MDS9509# show fctimer
F_S_TOV : 5000 milliseconds
D_S_TOV : 5000 milliseconds
E_D_TOV : 2000 milliseconds
R_A_TOV : 10000 milliseconds
```

To modify these values, use the following commands. Note that these changes can not be made unless all VSANs in the switch are suspended.

```
MDS9509# config t
MDS9509(config)# vsan database
MDS9509(config-vsan-db)# vsan 1 suspend

MDS9509(config)# fctimer e_d_tov 2000
<1000-100000> E_D_TOV in milliseconds(1000-100000)

MDS9509(config)# fctimer r_a_tov 10000
<5000-100000> R_A_TOV in milliseconds(5000-100000)
```

Step C3: Verify the fabrics are in proper Operating Mode

To enable interoperability mode on C-series switches, the first step is to place the VSAN of the E_Ports(s) that connect to the M-series in interoperability mode.

```
MDS9509# config t
MDS9509(config)# vsan database
MDS9509(config-vsan-db)# vsan 1 interop 1
```

Step C4: Verify/Configure Switch Domain IDs

The next step is to assign a domain ID in the range of 97 (0x61) through 127 (0x7F), while in interoperability mode, we are limited to a total of 31 switches in the fabric. In the MDS the default is to request an ID from the principal switch. If the *preferred* keyword is used, the MDS will request a specific ID, but still join the fabric if the principal switch assigns a different ID. If the *static* keyword is used, the MDS will not join the fabric unless the principal switch agrees, and assigns the requested ID.

```
MDS9509# config t
MDS9509(config)# fcdomain domain 100 preferred vsan 1
```

When making changes to the domain, you may restart the MDS domain manager function for the altered VSAN. You can force a fabric reconfiguration with the following commands.

```
MDS9509(config)# vsan database
MDS9509(config-vsan-db)# vsan 1 suspend
MDS9509(config-vsan-db)# no vsan 1 suspend
MDS9509(config-vsan-db)# exit
MDS9509(config)# exit
MDS9509#
```


Step C5: Verify proper Zoning Configuration is in place

Check for Duplicate Zone Sets (zones): To ensure proper zoning merge and operation, verify there are no duplicate active ZoneSets or Zones across the two fabrics that need to be merged. If there exists any rename them. You can verify zoning information by using the “show zone” command.

For example, to verify all active zones ...

```
MDS9509# show zoneset active vsan 1
zoneset name mdscore vsan 1
  zone name vz1 vsan 1
    * fcid 0x630500 [pwwn 50:06:01:60:88:02:90:cb]
    * fcid 0x610400 [pwwn 10:00:00:00:c9:24:3d:90]

  zone name vz2 vsan 1
    * fcid 0x630400 [pwwn 10:00:00:00:c9:24:3f:75]
    * fcid 0x6514e2 [pwwn 21:00:00:20:37:a7:ca:b7]
    * fcid 0x6514e4 [pwwn 21:00:00:20:37:a7:c7:e0]
    * fcid 0x6514e8 [pwwn 21:00:00:20:37:a7:c7:df]

  zone name vz3 vsan 1
    * fcid 0x651500 [pwwn 10:00:00:e0:69:f0:43:9f]
    * fcid 0x6105dc [pwwn 21:00:00:20:37:28:31:6d]
    * fcid 0x6105e0 [pwwn 21:00:00:20:37:28:24:7b]
    * fcid 0x6105e1 [pwwn 21:00:00:20:37:28:22:ea]
    * fcid 0x6105e2 [pwwn 21:00:00:20:37:28:2e:65]
    * fcid 0x6105e4 [pwwn 21:00:00:20:37:28:26:0d]

  zone name $default_zone$ vsan 1
```

Verify Proper Zone Naming

Ensure that zone names adhere to the following guidelines.

- All characters must be ASCII
- A name must be between 1 and 64 characters in length
- The first character of a name must be a letter. A letter is defined as either an uppercase [A-Z] or lower case [a-z] character
- Any character other than the first character must be either a lower case character [a-z] or an upper case character [A-Z] or a number [0-9] or the symbol (_).

Configure Zones using only Port Level Device WWNs

In the interoperability mode all the zone members must be defined using port level device WWNs only and defining them in any other way is not supported. For example, we can not define zones using FC port addresses or domain, port combinations etc. If there are any zones not defined as stated above, redefine them using proper port level device WWNs.

Step C6: Configure FCIDs with unique AREA bytes

It is required to configure each FCID with a unique AREA byte on MDS switches for the M-series and C-series switches to work properly in the interoperating fabric. Follow these steps to achieve this:

- enable persistent FCID
- configure unique AREA byte

Enable persistent FCID

```
MDS9509# config t
MDS9509(config)# fcdomain fcid persistent vsan 1
MDS9509(config)# exit
MDS9509#
```

Configure unique AREA byte

Now, verify if there are any devices with the same domain and AREA byte on the MDS switches. If there are such duplicates, then change these FCIDs manually to configure unique AREA byte.

As an example, consider two ports with the same AREA byte:

```
fc1/1(0x010501, wwn xx:xx:xx:xx:xx:xx:xx:xx) and
fc1/2(0x010502, wwn yy:yy:yy:yy:yy:yy:yy:yy)
```

- Obtain the WWN of the port to be configured. The "show flogi database" command can be used for this purpose.
- Shut down the ports to be configured

```
MDS9509# config t
MDS9509(config)# interface fc1/1
MDS9509(config)# shutdown
MDS9509(config)# interface fc1/2
MDS9509(config)# shutdown
MDS9509(config)# end
MDS9509#
```

- Now change the AREA byte

```
MDS9509# config t
MDS9509(config)# fcdomain fcid database
MDS9509(config-fcid-db)# vsan 1 wwn xx:xx:xx:xx:xx:xx:xx:xx fcid
                                0x01dd00
MDS9509(config-fcid-db)# vsan 1 wwn yy:yy:yy:yy:yy:yy:yy:yy fcid
                                0x01ee00
MDS9509(config)# end
MDS9509#
```

- enable the ports back

```
MDS9509# config t
MDS9509(config)# interface fc1/1
MDS9509(config)# no shutdown
MDS9509(config)# interface fc1/2
MDS9509(config)# no shutdown
MDS9509(config)# end
MDS9509#
```

Merging Fabrics and Verification

After configuring both the fabrics individually as described above, now the identified E-ports from both sides can be connected to merge them. The fabric should now reconfigure and merge itself into a single fabric.

To verify the fabric has merged properly, run the following commands on both M-series and C-series switch and ensure they are no segmentations or other errors.

On the M-series, Verify the following.

- Launch the EWS from your Web Browser
- Select the Monitor option and then Port List Tab
- Ensure the expected ISL ports show up as E-ports under the column “Type”

On the C-series

```
MDS9509# show vsan 1
vsan 1 information
      name:VSAN0001  state:active
      interoperability mode:1 ← verify mode
      loadbalancing:src-id/dst-id/oxid
      operational state:up
MDS9509# show fcdomain vsan 1
The local switch is a Subordinated Switch.
```

Local switch run time information:

```
State: Stable
Local switch WWN:      20:01:00:05:30:00:51:1f
Running fabric name: 10:00:00:60:69:22:32:91
Running priority: 128
Current domain ID: 0x64(100) ← verify domain id
```

Local switch configuration information:

```
State: Enabled
Auto-reconfiguration: Disabled
```

```

Contiguous-allocation: Disabled
Configured fabric name: 41:6e:64:69:61:6d:6f:21
Configured priority: 128
Configured domain ID: 0x64(100) (preferred)
Principal switch run time information:
Running priority: 2

```

Interface	Role	RCF-reject
-----	-----	-----
fc2/1	Downstream	Disabled
fc2/2	Downstream	Disabled
fc2/7	Upstream	Disable

```

MDS9509# show fcdomain domain-list vsan 1

```

```

Number of domains: 2
Domain ID          WWN
-----
0x61(97)          10:00:08:00:88:a0:b0:ae [Principal]
0x78(120)         20:08:00:05:30:00:1c:5f [Local]

```

Perform the following the command on the ports configured as E-ports
Example:

```

MDS9509# show interface fc2/4
fc2/4 is up
  Hardware is Fibre Channel, FCOT is short wave laser
  Port WWN is 20:44:00:05:30:00:1c:5e
  Peer port WWN is 20:10:08:00:88:a0:b0:ae
  Admin port mode is auto, trunk mode is on
  Port mode is E, FCID is 0x780000 ← verify mode is E-Port
Port vsan is 8
  Speed is 1 Gbps
  Transmit B2B Credit is 16
  Receive B2B Credit is 16
  Receive data field Size is 2112
  Beacon is turned off
  5 minutes input rate 40 bits/sec, 5 bytes/sec, 0 frames/sec
  5 minutes output rate 32 bits/sec, 4 bytes/sec, 0 frames/sec

```



```

347416 frames input, 20028116 bytes
  0 discards, 0 errors
  0 CRC, 0 unknown class
  0 too long, 0 too short
347409 frames output, 15423296 bytes
  0 discards, 0 errors
34 input OLS, 6 LRR, 1 NOS, 0 loop inits
17 output OLS, 8 LRR, 32 NOS, 11 loop inits
16 receive B2B credit remaining
16 transmit B2B credit remaining

```

Expected Behavior from Fibre Channel Services

While in “Interoperability mode”, all the fibre channel services from each of the switch types may not work the same as in Native Mode. However, the following behavior is expected in an interoperating fabric.

- **Zoning:** All zones will be done with port level device WWNs only. Thus each switch type will implement zoning in its native form as if only port level device WWNs were used. Other types of zoning definition are not supported.
- **FSPF:** The routing of frames within the fabric is not changed by the introduction of interoperability mode. However, note that the MDS-9000 will continue to use src-id/dst-id/ox-id to load balance across multiple ISL links, while M-Series will use their default src-id/dst-id, so the return route may be different from the initial route when passing through an MDS-9000.
- **Trunking/Port-Channels:** Trunking and Port-channels continue to work between switches of the same series only if they are allowed by the vendor’s “interoperability mode.” See [Table 1](#) and [Table 2](#) for more details.
- **Domain IDs:** A switch may have to change its domain ID to the range 97-127. This is to accommodate 31 domain address limitation followed by some vendors. If a domain ID is changed (which can be a disruptive event to the switch), all devices attached to the switch will need to re login to the switch. When domain IDs are changed, the switch itself will need to reregister with the principal switch in the fabric to verify domain ID uniqueness.
 - This is a switch wide event on M-series and hence requires setting the switch offline temporarily. So plan accordingly when changing the domain ID.
 - This event is limited to the vsan on C-series where the change is taking place. The MDS switch can perform this action, as the domain manager process for this vsan is restarted and not the entire switch. This still would require any devices logged into the vsan on that switch to re-login to obtain a new FCID.

Interoperability mode behavior summary by Switch Type

The following is a summary of interoperability mode behavior on C-series switches.

C-Series

Table 1: C-Series Interoperability Mode Summary

Minimum Firmware Level	1.3.4(a)
Supported M-series Switches	M-Series, see Table 3
VSANs	Only VSANs explicitly set for “interop mode” are affected. All others maintain their independence.
High Availability	Fully redundant dual supervisor modules maintain full functionality.
Domains	Domain IDs restricted to 97-127.
Port-Channels and TE ports.	Can still be used to directly connect two MDS-9000 switches together, even while in interoperability mode. However, they cannot be used to directly connect to a non-MDS switch. Standard E ports are required to connect to non-MDS switches.
Zones and Zonesets	Only the active zoneset is propagated. Up to 2000 zones can be supported by the MDS-9000. The “default zone” policy changes to “deny.”
Fabric Manager and Element Manager	Can still be used to fully manage the MDS-9000, and create zones to be distributed to the non-MDS platforms. FM can still view the entire mixed topology.
Security	Ssh, telnet, snmp-v3 are supported.
Device Support	Fabric pt2pt F-mode

M-Series

The following is a summary of interoperability mode behavior on M-series switches.

Table 2: M-Series Interoperability Mode Summary

Minimum Firmware Level	05.02.00-13
Supported Switches	C-Series, see Table 4
HAFM	HAFM can be used as the management tool in the interoperating fabric, identifies C-series switches as generic switches

Table 2: M-Series Interoperability Mode Summary (Continued)

High Availability	Fully redundant dual supervisor modules maintain full functionality.
Domains	Domain IDs restricted to 1-31 (which maps to 97-127).
Zones and Zonesets.	Only active Zone Set propagated. All zones must be configured using pWWNs only.

Merging Zones-Examples (using the CLI /Fabric Manager from C-series switches)

In this example, we first create three zones vz1, vz2 and vz3 on one of the C-series switches and verify these zones propagate to all the **C-series** and **M-series** switches in the interoperating fabric.

MDS9509# **config t**

Enter configuration commands, one per line. End with CNTL/Z.

MDS9509(config)# **zone name vz1 vsan 1**

MDS9509(config-zone)# **member pwwn 50:06:01:60:88:02:90:cb**

MDS9509(config-zone)# **member pwwn 10:00:00:00:c9:24:3d:90**

MDS9509(config-zone)# **exit**

MDS9509(config)#

MDS9509(config)# **zone name vz2 vsan 1**

MDS9509(config-zone)#

MDS9509(config-zone)# **member pwwn 10:00:00:00:c9:24:3f:75**

MDS9509(config-zone)# **member pwwn 21:00:00:20:37:a7:ca:b7**

MDS9509(config-zone)# **member pwwn 21:00:00:20:37:a7:c7:e0**

MDS9509(config-zone)# **member pwwn 21:00:00:20:37:a7:c7:df**

MDS9509(config-zone)#

MDS9509(config-zone)# **exit**

MDS9509(config)#

MDS9509(config)# **zone name vz3 vsan 1**

MDS9509(config-zone)#

MDS9509(config-zone)# **member pwwn 10:00:00:e0:69:f0:43:9f**

MDS9509(config-zone)# **member pwwn 21:00:00:20:37:28:31:6d**

MDS9509(config-zone)# **member pwwn 21:00:00:20:37:28:24:7b**

MDS9509(config-zone)# **member pwwn 21:00:00:20:37:28:22:ea**

MDS9509(config-zone)# **member pwwn 21:00:00:20:37:28:2e:65**

MDS9509(config-zone)# **member pwwn 21:00:00:20:37:28:26:0d**

```
MDS9509(config-zone)#
MDS9509(config-zone)# exit
MDS9509(config)#
MDS9509(config)#
MDS9509(config)# zoneset name mdscore vsan 1

MDS9509(config-zoneset)# member vz1
MDS9509(config-zoneset)# member vz2
MDS9509(config-zoneset)# member vz3
MDS9509(config-zoneset)# exit
MDS9509(config)#
```

At this point we have created 3 zones, vz1, vz2 and vz3. We have also created a “zoneset” titled “mdscore”.

Now we will activate the zoneset MDSCORE

```
MDS9509(config)# zoneset activate name mdscore vsan 1
Zoneset Activation initiated. check zone status
MDS9509(config)#
```

```
MDS9509(config)#
MDS9509(config)# exit
```

Now we will view each switch in the fabric to verify the zoning we defined is in place.

```
MDS9509# show zoneset active vsan 1
zoneset name mdscore vsan 1
  zone name vz1 vsan 1
    * fcid 0x630500 [pwwn 50:06:01:60:88:02:90:cb]
    * fcid 0x610400 [pwwn 10:00:00:00:c9:24:3d:90]

  zone name vz2 vsan 1
    * fcid 0x630400 [pwwn 10:00:00:00:c9:24:3f:75]
    * fcid 0x6514e2 [pwwn 21:00:00:20:37:a7:ca:b7]
    * fcid 0x6514e4 [pwwn 21:00:00:20:37:a7:c7:e0]
    * fcid 0x6514e8 [pwwn 21:00:00:20:37:a7:c7:df]

  zone name vz3 vsan 1
    * fcid 0x651500 [pwwn 10:00:00:e0:69:f0:43:9f]
```



```
* fcid 0x6105dc [pwwn 21:00:00:20:37:28:31:6d]
* fcid 0x6105e0 [pwwn 21:00:00:20:37:28:24:7b]
* fcid 0x6105e1 [pwwn 21:00:00:20:37:28:22:ea]
* fcid 0x6105e2 [pwwn 21:00:00:20:37:28:2e:65]
* fcid 0x6105e4 [pwwn 21:00:00:20:37:28:26:0d]
```

```
zone name $default_zone$ vsan 1
```

We should see the same information from other C-series switches that are connected in the same fabric.

Note: The below command can be used to save a copy of active zoneset in the local switch for editing, use this command after any new zones got added into the active zoneset due to merge with Mcddata.

```
MDS9509# zone copy active-zoneset full-zoneset v 1
```

```
WARNING: This command may overwrite common zones
        in the full zoneset
```

```
Please enter yes to proceed.(y/n) [n]? y
```

```
MDS9509#
```

Verify the zones propagated properly to M-series (using EWS/HAFM)

- Launch the EWS from your web browser
- Select Configure and then select the Zoning Tab
- Verify the zone set MDSCORE and zones vz1, vz2 and vz3 are properly identified

Creating zones on M-series (using EWS/HAFM)

- Launch the EWS from your web browser
- Select Configure and then select the Zoning Tab
- You can create, edit and delete zones
- You can also activate and de-activate zone sets

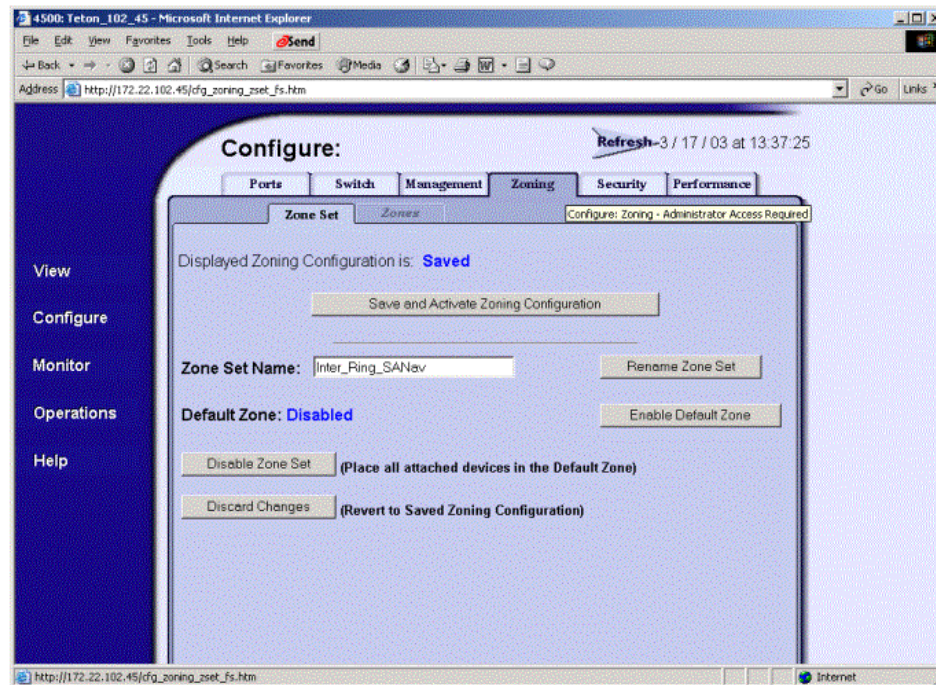


Figure 8: Creating zones using EWS/HAFM

To merge the existing Zone Sets from both the fabrics (and their associated zones) properly:

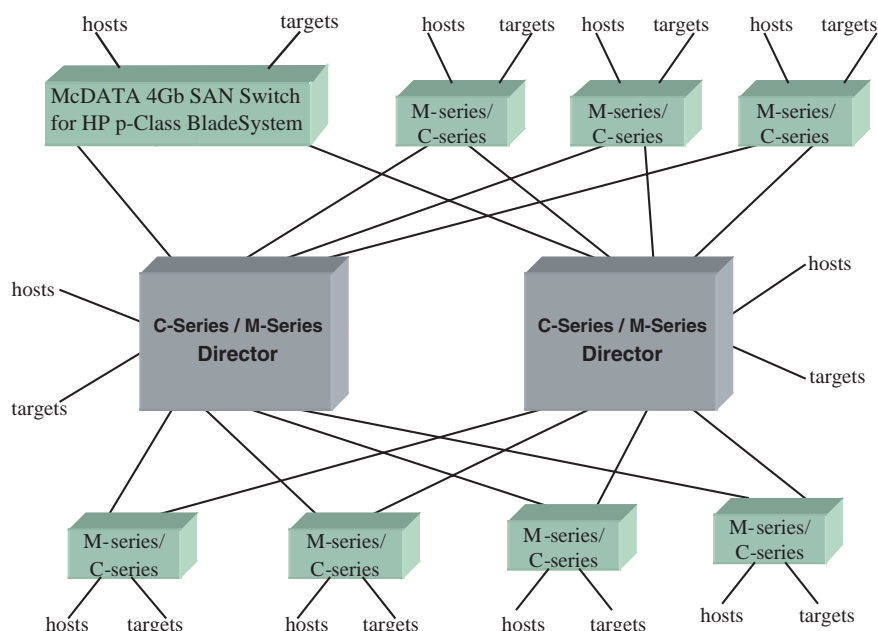
- Ensure that all the requirements, as specified in step-M5 and step-C5 are properly met
- Ensure that an active Zone Set is present in both the fabrics
- Join the fabrics and the active Zone Sets should merge

Once the merge is complete, to view and manage zones using HAFM, save the Zone Set. Use the "Save active zone set as.." button in "HAFM/Fabrics/Zone Set" for this purpose. Once you save it, the Zone Set and all zones will then be saved in the zone library.

Supported Configuration Rules

The following fabric configuration rules apply when mixing the two series switches.

- A maximum of 11 switches and 3 hops per fabric
- Up to 512 ports and a maximum of two directors per fabric(9509/9506 or director 2/64, 2/140)
- Each fabric can consist of mix of switches listed below
- Either C-Series Fabric Manager/Telnet OR M-series EWS/HAFM can be used for configuring and managing the zones. However, it is recommended to stick to one management tool only, instead of changing back and forth between the two.



Recommended IOP configuration diagram

Figure 9: Recommended IOP configuration**Table 3: Supported M-Series Switches**

HP StorageWorks Switch Name	Firmware Version	Number of Ports
HP StorageWorks edge switch 2/16	06.01.00-18 06.02.00-22 HAFM Notebook: 07-01-00-09 1U Appliance: 08-02-00-78 (Recommended) 07.02.00-9 (Minimum)	16
HP StorageWorks edge switch 2/24		24
HP StorageWorks edge switch 2/32		32
HP StorageWorks director 2/64		64
HP StorageWorks director 2/140		140
McDATA 4Gb SAN Switch for HP p-Class BladeSystem	M-5.2.0.29.00	10

Note: These are the minimum firmware versions. For the latest supported firmware versions, follow the link below by selecting the appropriate M-series product.

<http://h18006.www1.hp.com/storage/saninfrastructure.html>

Table 4: Supported C-Series Switches

C-Series Switch Name	Firmware Version	Number of Ports
MDS 9509	1.3.4(a) 2.0(1b) 2.1(2d)	Up to 224
MDS 9506		Up to 128
MDS 9216		Up to 48
MDS 9140		40
MDS 9120		20

Note: These are the minimum firmware versions. For the latest supported firmware versions, follow the link below by selecting the appropriate C-series product.

<http://h18006.www1.hp.com/storage/saninfrastructure.html>

Table 5: Supported OS Versions (minimum required)

OS	OS Version	Multi Path Software	HBA	Driver/ Firmware/BIOS (minimum required)
Windows 2000	AS SP3	Secure Path 4.0c	QLA 2342, LP8000	8.2.0.73/3.01.19/1.33 5-4.82a16 / 3.91a1 / 1.63a1
Windows 2003	AS SP2	Secure Path 4.0c	LP952	5-4.82a16 / 3.91a1 / 1.63a1
HP-UX	11.00/11.11	Auto Path 2.01.02	A5158A/ A6795A	11.00.10 PHSS_26799 11.11.09 PHKL_26799
OVMS	7.3-1	Native	DS-KGPSA-CA	Native /3.91a1
Tru64	5.1B	Native	DS-KGPSA-CA	Native /3.91a1

Table 6: Supported Storage System Versions

Storage System	Represents Architecture	Firmware Version (minimum required)
MA 8000	HSG 80	ACS 8.7F Patch 2&3
EVA 5000	HSV 110	VCS v3.010
EVA 4000/6000/8000	HSV 200, HSV 210	XCS v5.031 and v5.1
XP 1024	XP 128, XP 1024	V21.07.04.00/00

Table 7: HP BladeSystem Support

HP BladeSystem p-class	Operating System	Fibre Channel interface	Embedded switch	Storage
BL20p	Microsoft Windows 2003, Windows 2000 RedHat Enterprise Linux 3 and 4 (X86) Sles8 (X86) Sles9 (X86)	Qlogic ISP2312 based dual port Fibre Channel card	McDATA 4 Gb SAN switch for HP p-class BladeSystem	XP, EVA
BL60p	HP-UX 11i	Qlogic ISP2312 Fibre Channel Ports (2Gb/s)		

Troubleshooting

1. After merging the fabrics, if you see segmentation errors on any of the switches, verify that interoperability mode is enabled on all switches in the fabric
2. Ensure all the time out values are set properly, specially E_D_TOV (2 secs) and R_A_TOV (10 secs)
3. If you see an ISL on the M-Series product that segments due to a Build Fabric Protocol Error, you can recover by blocking, then unblocking the port. You may need to do this several times.
4. If you have zone merging problems, check the following:
 - Remember the Active Zone set in the M-Series and the Active Zone set in the C-series must be unique. You cannot have the same zone name with different WWN members.
 - Only WWN zoning is permitted for heterogeneous fabrics. Domain, Port, or Area zoning are not supported.
 - Make sure the zones are compatible between the M-Series and C-series. See step-M5 and step C5 described earlier in this document